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ABSTRACT

Both quantitative and qualitative evaluation methods were used to compare perceptions of teacher participants and non-participants in a Title II science update inservice program. The purpose of this article is to compare participants' and selected non-participants' perceptions of their motivations to learn using two evaluation methods. Qualitative evaluation methods were used to provide depth to the quantitative interpretations of the results. The 2-week Science Skills Inservice (SSI) for 15 teachers was conducted at Sioux Falls College in June 1988. Demographic responses of teachers in the SSI group were similar to the exemplary teachers who participated in a nation-wide study. Results of the Science Attitude Inventory indicated that teachers in the SSI group also had similar attitudes towards science as the exemplary teachers in the nation-wide study. A 6-month follow-up questionnaire ascertained the extent of perceived measurable change that had occurred as a result of the project. (MVL)

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Using Qualitative and Quantitative Methods To Determine Science Teacher Inservice Participants' Motivation To Learn

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Using Qualitative and Quantitative Methods to Determine Science Teacher Inservice Participants' Motivation To Learn

Purpose of the Study

Understanding a teacher's motivation to learn and to use motivating techniques in the classroom can help in the design of inservice projects that create environments for application and positive change with children in the classroom. interpretive methods, as well as quantitative methods, can enhance understanding about teachers' motivation to learn. A exerpt from the following interview with a teacher illustrates the clarity of gathering data on motivation from the participants' perspective:

> "....I feel there is always room for improvement and I'm looking for improvement. I want to involve my students some more in hands-on experiments and more outside of the textbook, because I think it excites the kids more and the learning is more concrete. The learning tends to stick in their minds more. I want to do the change myself. I have already started that: looking at classes that are available, methods, learning more information about the sciences--the individual sciences, and speaking with other teachers--finding out what works for them. Finding out through us the teachers, what we need. I think that is what (the researcher) is trying to do here." (Teacher participant, SSI)

Using information from quantitative and qualitative evaluation methods in science education research has been used to obtain a richer understanding of findings by Rossman and Wilson (1985) and by Green and McClintock (1985). Lawrenz (1988) used qualtitative and quantitative research in comparing inservice programs. She used qualitative components to provide "richness" to the data and for identifying potentially relevant variables. The degree of the effects were documented by the "hard" data of the qualtitative components.

Some teachers foster the "motivation to learn" in their classrooms. These teachers emphasize the purpose or immediate value in the skill or concept to be learned for itself. External goals or rewards are not often used by motivating teachers to encourage learning (Brophy, 1983). Motivated and motivating teachers challenge students to learn; make learning fun. Students have clear responsibilities in learning. Motivating teachers use motivating techniques, not only to set the lesson, but throughout the lesson as needed. Student involvement is a high priority of motivating teachers. Motivating teachers monitor on-task behavior positively, and have an underlying view that children can achieve and be motivated irregardless of ability or other grouping (Marshall, 1987).

The reason for selecting interpretive research as part of the methodology in this study of inservice teachers' motivations to learn and to change, is to attempt to close the gap between quantitative data results and actual practice. Some fundemental questions on the motivation to learn can be addressed with interpretive research:

1. Why are the teachers in this project (SSI) motivated to learn? A tally of learning products or project evaluation results doesn't tell the whole story.

2. What are the teachers' perspectives or frames of reference on motivation to learn?

3. How is motivation achieved in this project? Motivation is an illusive quality which changes with setting, persons involved, and treatment. That which enhances motivation can be more accurately described by closely examining the detail of school setting that teachers perceive to impact on teaching. The interpretive research method seeks to find specific meaning in present actions by interpreting them within the "microculture" of the classroom (Erickson, 1986).

Inservice Education: 1986 AETS Yearbook provides guidelines to those who design science inservice for teachers. The Title II *Science Skills Inservice for Elementary Teachers* (SSI) was conducted at Sioux Falls College, June 13-24, 1988. The project was modeled after the recommendations from the AETS yearbook. Providing a non-threatening climate of trust, respect, and cooperation, in which participants were willing to try new experiences was an underlying aim of the project.

In 1982, the National Science Teachers Association used the synthesis of qualitative research formulated by expert panels to develop criteria for selecting exemplary K-12 science programs throughout the United States. Program goals, curriculum structure, instructuional strategies, evaluation techniques, and teacher characteristics were areas considered as state science supervisors nominated programs. About ten elementary science

programs were more carefully studied using the following "Criteria for Search for Excellence in Science Education:"

1. Focus on effective consumer behavior
2. Deal with effective personal health practices
3. Recognize the effect of people on the environment and vice-versa while developing an ethic of custodianship
4. Provide vehicles for students to experience variation in the interpretation of data
5. Provide students with experiences that demonstrate the hard work involved with resolving problems
6. Focus on a great variety of the dimensions of science
7. Recognize the "people" involved with scientific pursuits (Yager, 1986)

Two elementary programs were chosen among the six sites for Centers of Excellence, and were studied by a team of researchers. Subject matter, curriculum materials, teachers and teaching, science coordinators and administrators, school and community were examined. Characteristics of teachers in the exemplary elementary science programs were gathered from questionnaires and interviews.

These characteristics of excellent teachers in noteworthy science programs form the basis of my assumption that teachers who fulfill these characteristics are motivated learners and can motivate children to learn:

1. Provide a stimulating environment
2. Create an accepting atmosphere
3. Expect different students to achieve differently

4. Put in far more than minimal time
5. Have high expectations of themselves
6. Challenge students beyond ordinary school tasks
7. Are tmeselves models of active inquiry
8. Do not view classroom walls as a boundary
9. Reequently use societal issues as a focus
10. Work easily with community leaders, administrators, and parents
11. Are extremely flexible in their time, schedule, curriculum, expectations, and view of themselves
12. Are concerned with developing effective communication skills
13. Provide sustematically for feelings, reflections, and assessments
14. Require considerable student self-assessment
15. Ask questions, expecting to hear new, and often unpredicted, answers
16. Expect students to question facts, teachers, authority, and knowledge
17. Encourage pargmatism
18. Stress science literacy
19. Want students to apply knowledge
20. Do make a difference. (Bonstetter et al, 1983)

The purpose of this article is to describe the SSI elementary teacher participants' motivation to learn and to change, using qualitative and quantitative methodologies. Two assumptions made by the researcher are fundemental to the findings of this study:

Assumption 1: Teachers selected to be a part of Teachers in Exemplary Programs: How Do They Compare?, the nation-wide study by National Science Teachers Association (NSTA), are motivated to learn and to change.

Assumption 2: The list of characteristics of exemplary teachers compiled in the NSTA study are also characteristics of other teachers who are motivated to learn and to change.

Later work will compare SSI participants' motivation to learn with non-participants and with nation-wide exemplary science teachers identified in Teachers in Exemplary Program: How Do They Compare? The specific question to be addressed in this paper is: **What are the motivations to learn and to change experienced by the SSI partipants?**

Design and Procedures

A two-week science skills inservice (SSI) for K-6 teachers of science was conducted at Sioux Falls College in June, 1988. The objectives for the participants included:

1. Improvement from pre- to post-test scores in science knowledge of selected science and related fundamental topics.
2. Positive change in attitudes of participants toward science.
3. Encouraged teachers to apply knowledge gained from inservice by developing classroom laboratory investigations, compiled in a handbook, for teachers' future use.

Fifteen underprepared elementary teachers from the Sioux Falls area were selected as project participants. All except one SSI participant were from twelve, small, rural districts classed as "B" or "AA" schools, among the smaller districts in South Dakota. Lecture/discussion, laboratory investigation, field trips to area "real life" sites illustrating utility of fundamental topics comprised the program of study in the institute. The teachers were provided time to interact with each other and to develop laboratory investigations. Additionally, luncheon seminars to enhance understanding of science learning/teaching were provided for participants. Products for elementary teacher participants included:

1. Background understanding of selcted science fundamentals with supplemental computer learning and mathematics.
2. Additional understanding of teaching/learning science through luncheon/seminars
3. Elementary classroom investigations or curriuclum aids developed by participants
4. Poster session for participant presentations as a review of understanding
5. Handbook of collected elementary classroom investigations and curriculum aids developed by participants for use by participants and colleagues.

Both interpretive, or qualitative, research (Erickson, 1985) and quantitative research methodologies were used to more fully describe the motivations to learn of the SSI participants. The data were gathered from several sources (See Table 1). The independent evaluator's Final Report of

the SSI, found in Appendix A, was used to document cognitive and product gains made by the partipants.

Insert Table 1 about here

Prior to the inservice, teachers responded to a questionnaire which supplied self-disclosure characteristics of participants, as well as demographic data. Table 2 shows the questionnaire results. The questionnaire consisted of items asked of teachers identified as exemplary teachers in the nation-wide "Search For Excellence" (Bonstetter, et al, 1983). The researcher later plans to make a comparison of motivation characteristics of these underprepared teachers and identified exemplary teachers.

In personal interviews with each participant, teachers responded to open-ended questions, which allowed teachers to phrase motivation to learn responses from their own perspectives. See Appendix B for the interview questions.

Brainstorming techniques were used throughout the project to enhance participation in synthesis discussions as well as in forming new ideas. Near the end of the inservice participants contributed to the motivation to learn ideas in Table 3.

Table 1: Research Methodology for SSI Participants' Motivation to Learn

1. Independent evaluation report	Quantitative Methodology
2. Pre-institute questionnaires	Quantitative Methodology
3. Personal interviews with SSI participants	Qualitative Methodology
4. Brainstorm session with SSI participants	Qualitative Methodology

Results and Conclusions

Using four groups of quantitative and qualitative data, the motivations of the SSI participants to learn and to change will be described.

1. Independent Evaluation Report

The Final Evaluation Report, in Appendix A, summerizes the participant gains during the project. The Scientific Attitude Inventory (SAI), developed by Moore and Sutman (1970), was administered to determine initial attitude about science and change in attitude during the inservice project. The pretest scores were very high on the "positive" attitude subset and low in the "negative" attitude subset. No significant change was found in the posttest scores.

Prior to the first session of the inservice, a pretest of 20 objective items relating to science knowledge was administered to participants. Following the last session, a posttest of the original 20 objective items plus 27 additional items were administered to participants. The group averaged 45 percent competency on the pretest and 72 percent on the identical posttest items- an improvement of 27 percent. Table 2 shows that the difference between the pre and posttest scores was statistically significant.

Table 2 about here

Poster presentations by participants were well received. A handbook

Table 2: SSI Teachers' Science Content
Comparison of Pretest and Posttest Scores

Pretest			Posttest			t ratio
N	X	SD	N	X	SD	
15	12.80	3.55	15	20.46	2.53	11.21*

*Significant at the .001 level

of participant investigations was a product of the inservice project. Participants evaluated the content and process following each session. Typically, the participants characterized the sessions as interesting and focused on clearly stated objectives, which were met. The topics covered were viewed as relevant to their teaching needs. The participants especially appreciated the laboratory investigations and field trips.

A follow-up survey was mailed to participants to ascertain the extent of application of the inservice and determine change in teaching. Only three of the fifteen responded, after telephone reminders. One respondent was not currently teaching science, the second claimed no change from the "already positive approach to science." The third respondent described a change in teaching more science, and more self-confidence in dealing with science content. Several participants presented the results of their classroom efforts in a "Teacher Share" held at Sioux Falls College on October 8th, 1988.

Overall results of the project were positively viewed by participants. That they improved their scores on their science cognitive tests and all completed all the requirements of the project showed their commitment to achievement. In that success in achievement is positive external reward towards motivation, participants were reinforced by their gain in understanding. Their attitudes toward science were high at the outset of the project, and remained high. The individuals who presented classroom results in the "Teacher Share" were additionally reinforced as they illustrated the implentation of additional science investigations into their science curriculum. Modification of the survey procedure is needed to get

more complete follow-up feedback of participants.

2. Pre-institute questionnaires

SSI participants all completed a questionnaire before attending the inservice. Items consisted of demographic data and motivation to learn items found in the Teachers in Exemplary Programs (Bonnstetter, et al, 1983). Table 3 shows the percentage of participants who responded to each of the items. Fourteen of the fifteen participants were female. They are a stable population of 25-35 year old teachers with 10.7 years of experience. South Dakota teachers' salary ranks last in the nation. Only 27 percent have taken a college course in the past five years. Sixty percent of the participants perceived themselves adequately prepared to teach science. They most often use lecture/discussion approach in teaching, and frequently use worksheets and teacher demonstrations in presenting lessons.

Table 3: Questionnaire Results about here

By far, SSI participants' main source of support and for resources are other teachers; 87 percent of the teachers agree. They also depend on journals and other periodicals for resources. Principals are a source of support, according to 33 percent of the teachers.

Table 3: SSI Elementary Teachers: Pre-inservice Questionnaire
(N=15)

Male	7%
Female	93%
Experience (years)	10.7
Years in District	7.6
Age	34
College Course in last 5 yrs	27%
Not Well Qualified to Teach Science	33%
Adequately Qualified to Teach Science	60%
Well Qualified to Teach Science	6%
Hours a Day Spent Teaching Science (0-2 hours daily)	60%
Frequently Used Teaching Approaches:	
Use lecture/discussion almost daily	100%
Worksheets, at least weekly	66%
Teacher demonstrations, at least weekly	40%
Other individual assignments, at least monthly	100%
Laboratory Investigations, at least monthly	73%
Student reports or projects, at least monthly	73%
Test or quizzes, at least monthly	60%
Most Helpful Resources in Teaching:	
Other teachers	87%
Journals and other professional publications	40%
College courses	27%
School inservice programs	27%
Main Sources of Support in Teaching:	
Other teachers	47%
Principal	33%
School board	27%
Parents	27%
Most Serious Problems in Science Instruction:	
Out-of-date teaching materials	40%
Belief that science is less important than other subjects	20%
Lack of materials for individualizing science	20%
Teachers inadequately prepared to teach science	6%
Desire Assistance in Science Instruction But Receive Little or None:	
Learning new teaching methods	53%
Implementing investigative approach	47%
Using manipulative materials	40%
Obtaining science background information	33%
Obtaining information about instructional materials	33%
Team work for instruction across grade levels	26%

Forty percent of these teachers perceive out-of-date teaching materials to be one of their most serious problems in science instruction. The belief that science is less important than other subjects and lack of materials for individualizing science are also concerns. Over 50 percent of the SSI participants want help in learning new teaching methods, in using an investigative approach in science instruction, and more skill in using manipulative materials, but receive little or no help in these areas. Although these teachers perceive themselves not more than adequatey well prepared to teach science and receive very low pay, they agree that they are interested in finding support and assistance to improve instruction. Only minimal external rewards have been provided for the SSI teachers to learn and to change. According to their statements in interviews, some intrinsic rewards are the main sources of encouragement in their motivation to learn and to change.

3. Personal Interviews with SSI Participants

Each participant was seperately audio-tape interviewed to find more about what makes the participant want to learn and to change. The questions are found in Appendix B. Participants were asked to rate themselves with regard to personal satisfaction with teaching at the home district. On a ten point scale (with 10 as a high rating), participants rated their satisfaction with teaching as 8.62. Later in the brainstorm results, teachers comment that they cannot become motivated unless they are reasonably satisfied with their present condition. If this is true of this group, then their perceived environment is receptive for motivation.

What are some areas for teaching change that SSI participants view as needed, and how can these changes best occur? One respondent says:

"I think I needed more time and equipment to do more hands-on learning. The curriculum was too full of other things that are more important. I feel (students) need a better grasp of the concepts that they are looking for, rather than looking up answers and repeating answers....understand the concepts, problem-solving. I find science interesting, and I enjoy teaching it. I guess that's what motivates me."

Another teacher says:

"I was hoping this science class would benefit me in the areas that I feel inadequate and weak. I like to know exactly what I'm going to do and how I'm going to do it. So I like to be adequately prepared ahead. I want to make the class interesting and be able to answer all the students' questions."

Some ways to change are offered by another participant:

"We're getting a good start now, I'd say. Sharing with other teachers, opening our eyes to things around us with the fieldtrips; seeing how to apply practical things in science to our own learning. It's difficult to do these things without resources to get projects started. Our fieldtrips to ___have been very stimulating to me. Possible some of these fieldtrips would be good for students too."

About change, an SSI participant says:

"I think that I work constantly on trying to find new ways to do things a little bit differently. I had a class last year with chapter kids and some gifted students. It's difficult to teach such extremes, and I

sometimes fear I fail everyone by teaching to the middle...I'm slow to change. I have to feel the dissatisfaction for a while. It's not easy because you're talking about having kids do something differently. You decide what's important and sometimes you change your priorities."

A teacher relates about dissatisfaction and change:

"I don't feel I did as good of job as I could have last year. I didn't have the background, and I didn't know where to go with the lesson. I think I will have to sit down and write a plan for my science for the year. It isn't that I don't have a textbook....what motivates me is coming to a class like this, and seeing what can be done. If you don't get revved up, you have a tendency to pull away from the areas that you're less familiar with or toward that which is easier to do."

About change:

"I think I need to change my teaching to make science more enjoyable for the kids. Many times if they had a choice, they'd as soon skip science. I've been trying to take a class like this to give me some ideas. I know I'm tied to the textbook, and don't want to leave it. I need more resources close at hand so I could do more of these kinds of activities."

In these interviews, teachers were encouraged to think about their satisfaction with their science teaching and what they can do about it. They need the continuing support from administration and funds with which to obtain more than most modest resources in order to teach science through investigation. The teachers generally had clear ideas about what they wanted to see improved. Considering some of the

problems they face, these teachers were optimistic as well as pragmatic about the possibility for changes. They recognized that the basic change for improvement has to rest with the teacher.

4. Brainstorm Session with SSI Participants

Because this group of participants had used the brainstorm approach as the way to share ideas several times before, they seemed to sythesize the main points from individual questionnaires, from interviews, and from informal discusssions very well in this session. Table 4 summerizes that which motivates the SSI teachers to learn and to change.

Table 4: Brainstorm Session about here

One of the gross differences between SSI teachers' characteristics and the characteristics of exemplary teachers discussed earlier, is in what SSI teachers perceive to be needs for change. SSI needs for change are fundemental needs. Modest resources, up-to-date science textbooks, more moral support from administration, and background material for teachers to use with classes are examples of fundamental teaching needs. None of these teachers have a science specialist available to them for sounding out innovative ideas. Given the sparce curriculum funds and minimal teaching salary, less motivated teachers would have many reasons to not learn or strive for improvements in the science learning environment. Nonetheless, the intrinsic goals predominate the statements made by the

Table 4: **Brainstorm Session: What Motivates Me To Learn and To Change?**

* Self-satisfaction
* Dissatisfaction
* Students having a successful learning experience
* Desire to remain current
* Want to understand what goes on in area science industry, such as the EROS Data Center
* As society changes, change with it
* Finding resources such as at area colleges
* Wanting to be up-to-date on science background
* Find personal interests in science, such as insect collection, and pursue them
* Avoiding investigations that I don't like, such as electricity
* Knowing interests of the children in my classes-help them study something they like
* Designing curriculum to meet the students' needs
* Circumstances such as change in science certification, change in principal, need to teach different grades, cause need to take classes
* You have to know that what you are doing now is O K.--wait until you are secure about your teaching before you begin to make changes.
* The gauge for measurement is myself, not professional ladder
* I'm not complimented until I am evaluated--never get that feedback
* Need the support of the principal-I don't feel like I know anything if I ask questions.

teachers. Desire to be well-informed in current science background, being secure enough to seek answers to unknown questions, and having a genuine concern for student learning are themes in these teachers' statements. These motivating goals are shared by the exemplary teachers in nation-wide science programs. Given the thin extrinsic support for their efforts, these teachers' motivations to learn and to change are to be applauded.

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SCIENCE SKILLS INSERVICE

Evaluation Report

INTRODUCTION

The Sioux Falls Area Elementary Teacher Science Skills Inservice was held June 13-24, 1988. This project was evaluated both qualitatively and quantitatively through pre-post content and attitude assessments, participation, and interviews. Following is a summary report of the evaluation procedures and results.

EVALUATION PROCEDURES AND RESULTS

Three major components of the inservice project were evaluated: 1) the participants, 2) the presenters, and 3) the content sessions. Various measurement instruments and techniques were used to gather data upon which to judge the outcomes of the experience.

Participants

The objectives, stated in the grant proposal, suggested that participants would: 1) demonstrate a positive change in their attitude toward science, 2) score higher on the post- than on the pretest over the content, and 3) make presentations in the poster session.

1) Attitude toward science. In order to determine whether participant attitudes toward science were affected by the inservice experience, the fifteen participants were pre- and posttested with The Scientific Attitude Inventory (SAI), developed by Moore and Sutman (1970). The SAI is composed of sixty items arranged in a statement format with five-point Likert-type scale for responses. The sixty items are subdivided into subscales focusing on intellectual and emotional attitudes, both positive and negative. The pretest scores for the group were very high on the "positive" attitude subset and low in the "negative" attitude subset. The posttest scores showed no significant change from the pretest. A copy of the instrument and a summary of the results can be found in Appendix A.

2) Content pre- posttest. Prior to the first session of the inservice, a pretest was administered to the fifteen participants. This test consisted of 20 objective items relating to the topics to be covered in the seven subsequent content sessions. Immediately following the last session, a posttest was administered. This test included the 29 pretest items as well as 27 additional

objective items. The group averaged 45 percent competency on the pretest and 72 percent competency on the identical posttest items--an improvement of 27 percent. The difference between the mean scores of the pre- and posttest was statistically significant. Copies of the tests and a summary of the results can be found in Appendix B.

3. Curriculum aids and poster presentation. Each of the participants applied concepts presented in the sessions by developing elementary laboratory investigations or curriculum aids and by presenting projects at a poster session. Both the projects and the presentations were judged by the inservice administrator to be of high quality.

Presenters

Immediately following each of the seven topic sessions, the participants were asked to evaluate the session and the presenter by completing a brief survey from. The form consisted of a semantic differential scale and several open-ended questions. Without exception, the presenters were rated very favorably. They were characterized as being interesting, well-organized, modeling good teaching style, and clearly stating and meeting the objectives. On the final day of the inservice, participants were asked to evaluate the total two-week experience by responding to several open-ended items. In response to the question, "What did you especially like?", several participants commented on the positive attributes of the presenters. Copies of the evaluation instruments and a summary of results can be found in Appendix C.

Content Sessions

Participants evaluated the content and process following each session and also again at the end of the inservice. Typically, the participants characterized the sessions as interesting and focused on clearly stated objectives which were met. The topics covered were viewed as important and relevant to their teaching needs. The participants especially appreciated the hands-on lab experiences and the field trips. The luncheon seminar sessions were considered interesting and informative. The suggestions for improvements included few assignments, more "breaks", and generally less intensity throughout the experience. The forms used to collect this data, as well as the summarized results, can be found in Appendix C.

Presenters' Evaluation of the Inservice

Each presenter was interviewed by the project evaluator and asked two general questions:

1) "What do you consider to be the favorable aspects of the

inservice project?"

2) "What criticisms or suggestions for improvement do you have?"

In general, the presenters felt very positive about their experiences with the participants. They viewed the sessions as valuable learning opportunities for both participants and presenters. The suggestions for change related to scheduling, the physical environment, and the communication among inservice staff. The interview reports can be found in Appendix D.

EVALUATION SUMMARY

1. Participants made significant improvement from science content pre- to posttest scores, with an average gain of 29 percent.

2. Pretest scores (as measured by the SAI) indicated a strong positive attitude toward science and did not change significantly during the two week period.

3. The inservice experience, presenters, and content were viewed by the participants as valuable and of high quality.

4. The criticisms and suggested changes related primarily to scheduling and assignments.

SCIENCE SKILLS INSERVICE

Evaluation Summary

Would you recommend this workshop experience to other teachers?

No - 1 Yes - 14

Do you have suggestions for improvements:

Topics/content----------Too much outside work
Too deep/advanced

Schedule----------Need breaks
Days too long

Other----------Curriculum lab earlier
Too intense
Need free lunch time 1111

What di you especially like?

Variety: topics, presenter styles - 3 comments
Field trips - 5
Poster session - 8
Presenters - 4
Labs
Learned
Application

What is your reaction to the luncheon seminars? (See list of topics on other side of page, if needed)

Interesting - 9 comments
Informative - 5

OTHER???

PRESENTER INTERVIEWS

Summary of Remarks

QUESTION #1: "What do you consider to be the favorable aspects of the inservice?"

Comments Relating to Participants:

- Increased content knowledge through exposure to new ideas
- Interacted with "scientists" as equals
- Gained confidence (evidenced in the closing experience)
- Exhibited positive attitudes, enthusiasm, and competency
- Nine of the 15 participants volunteered to take part in the follow-up experience

Comments relating to Activities/Content:

- Brainstorming sessions were valuable
- Excellent field trip experiences
- Labs emphasized application
- Variety of topics and presenter personalities
- Broad approach was appropriate for this particular participant group

Other:

- Useful handbook was compiled (future reminder to participants of their competency)
- Presenters benefitted from working and interacting with each other

QUESTION #2: "What improvements do you suggest?"

Modified schedule
- Longer time in curriculum lab
- One-day topic sessions
- More unstructured time (breaks, lunch)

Fewer physical distractions in the lab/classroom
More depth of content
Less time devoted to field trips; more time for hands-on labs
More appropriate/comfortable classroom
Increase communication among presenters during the planning stages
Involvement of presenter beyond his/her own session
More information given to presenters regarding the grant proposal

PRESENTER/SESSION EVALUATIONS

Total Percentages

The numbers located on the semantic differential scale represent percentages of total responses to the seven presenters and sessions. For example, 49 percent of all the marks given on the "interesting/dull" scale were placed in the extreme left (i.e., most favorable) position.

N = 105 for each line or scale
Presenters/sessions = 7
Participant evaluators = 15

interesting	/ 49 / 36 / 12 / ___ / 3 / ___ / ___ /	dull
stressed important material	/ 45 / 36 / 15 / 2 / 2 / ___ / ___ /	stressed trivia
objectives clearly stated	/ 54 / 33 / 10 / 3 / ___ / ___ / ___ /	objectives unknown
objectives were met	/ 52 / 33 / 10 / 2 / 3 / ___ / ___ /	objectives not met
was relevant to my teaching needs	/ 38 / 21 / 23 / 8 / 4 / 3 / 3 /	was "off base" for me
well organized	/ 62 / 30 / 8 / ___ / ___ / ___ / ___ /	poorly organized
gave me new ideas	/ 41 / 35 / 17 / 3 / 1 / 2 / 1 /	same old "stuff"
good teaching style was modeled	/ 52 / 38 / 8 / 1 / 1 / ___ / ___ /	no evidence of good teaching style
I would advise other teachers to attend	/ 53 / 33 / 10 / 2 / 2 / ___ / ___ /	I would advise other teachers NOT to attend

What did you especially like about this session?

Hands-on lab - 29 comments
Instructor - 24 comments
Field trip - 24 comments

What should have been handled differently?

Shorter sessions/more free time - 9 comments
Too advanced for elementary education - 8 comments
Schedule too intense - 3 comments
Objectives unclear - 2 comments
More semester credit - 2 comments

Appendix B

SSI Interview With Participants

Purpose: I'm interested in learning about what makes you want to learn and to change. The interview will last about 20 minutes.

1. How do you rate your satisfaction with your teaching at your school, on a scale of 1-10, with 10 being very high? Because?....

2. Expand each reason for dissatisfaction.

3. To help you be more satisfied with your teaching of science, what would you like to change and how?

4. How would these changes you'd like to make at your school help your students?

5. What else drives you to change and learn with your science teaching?